

# Lyocell Based Carbon Carbon Composite for Use as a Large Exit Cone Material, Phase I

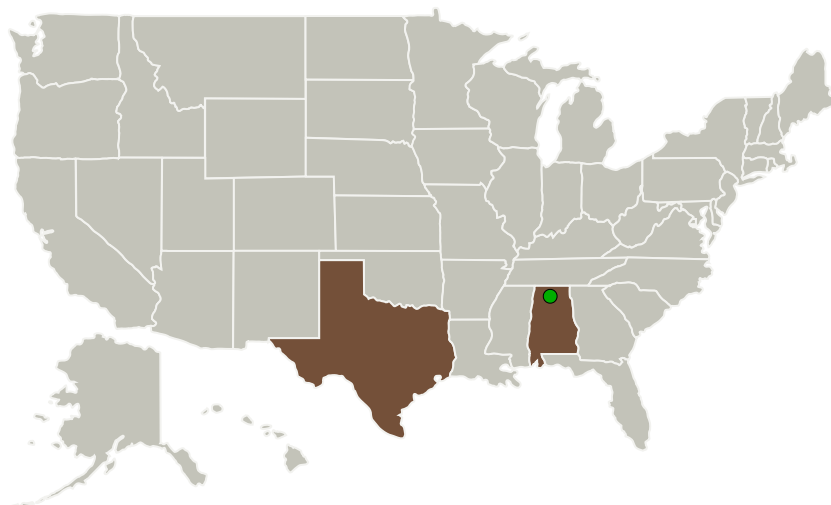
Completed Technology Project (2012 - 2013)



## Project Introduction

The NASA Office of the Chief Technologist (OCT) has identified a "carbon-carbon nozzle (domestic source)" as a "Top Technical Challenge" in the 2011-2016 timeframe in the "Launch Propulsion Systems Roadmap" document. This program, by utilizing a demonstrably capable team with a deep history in the manufacture, testing, and analysis of C/C materials, will address this need by developing a Lyocell C/C composite system aimed at the need for a composite J2X nozzle extension. The proposed Lyocell based system will have the advantages of being thermally compatible with, specifically, the TEG manifold of the J2X and will have a domestic supply chain. This technology has the capability to save hundreds of pounds of weight over the current (and less capable) metal based nozzle extension. Therefore, the overall objective of this program is to develop a viable, domestically produced Lyocell based C/C that passes margin of safety requirements for use as a J2X nozzle extension material.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Carbon-Carbon Advanced Technologies, Inc.	Lead Organization	Industry	Kennedale, Texas
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama
Southern Research Institute	Supporting Organization	Academia	Birmingham, Alabama

## Primary U.S. Work Locations

Alabama	Texas
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## Project Transitions

▶ **February 2012:** Project Start

✓ **February 2013:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138284>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Carbon-Carbon Advanced Technologies, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Principal Investigator:

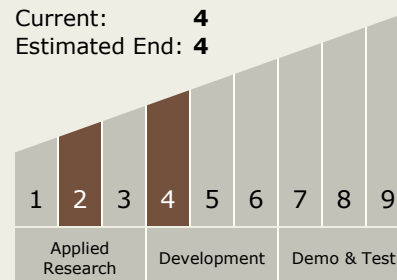
John Koenig

## Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



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## Technology Areas

### Primary:

- TX01 Propulsion Systems
  - └ TX01.1 Chemical Space Propulsion
    - └ TX01.1.3 Cryogenic

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System